

What is claimed is:

1.           A channel recovery method comprising the steps  
2 of:  
3           monitoring whether no synchronization is  
4 established for a predetermined period of time between a  
5 radio base station and a radio base station control  
6 station which constitute a mobile communication system;  
7 and  
8           trying channel re-synchronization upon  
9 shifting a timing of a channel synchronization clock  
10 used for communication between the radio base station  
11 and the radio base station control station.
  
2.           A method according to claim 1, wherein  
2           the step of monitoring comprises the steps of:  
3           detecting a state change by monitoring, in a  
4 predetermined cycle, operation states of a plurality of  
5 cards constituting the radio base station and having  
6 different functions;  
7           determining whether or not contents of a state  
8 change correspond to a channel disconnection of an  
9 operational channel; and  
10           starting a channel synchronization loss  
11 detection timer in which a time during which a state  
12 change is monitored is set, thereby determining whether  
13 or not a channel synchronization loss has occurred, and

14                   the step of trying the channel  
15 re-synchronization comprises the steps of:  
16                   trying channel re-synchronization when it is  
17 determined that a channel synchronization loss has  
18 occurred, and  
19                   when a channel re-synchronization trial fails,  
20 notifying a maintenance/monitoring console of the  
21 failure.

3.               A method according to claim 2, wherein the  
2 step of detecting comprises the steps of  
3                   periodically starting a card state monitoring  
4 timer which defines a cycle in which an operation state  
5 is monitored,  
6                   monitoring an operation state of each card  
7 when the timer expires,  
8                   when a state change is detected, checking  
9 whether detected contents are identical to those  
10 previously detected, and  
11                   storing the contents when the detected  
12 contents differ from those previously detected.

4.               A method according to claim 2, wherein the  
2 step of determining whether or not a disconnection of  
3 the operational channel has occurred comprises the steps  
4 of  
5                   specifying a card whose state change is

6 detected as a card having a specific function, and  
7 determining whether or not contents of the  
8 state change correspond to a channel disconnection  
9 during operation of the card.

5. A method according to claim 2, wherein in the  
2 step of determining whether or not the channel  
3 synchronization loss has occurred, if contents of the  
4 state change correspond to a channel disconnection  
5 during operation of card, a channel synchronization loss  
6 detection timer is started, and a re-synchronization  
7 monitoring flag for identifying a card having undergone  
8 a channel disconnection is turned on to detect a change  
9 in state of the same card within a timer time in a  
10 channel synchronization loss detection timer; it is  
11 determined that the channel disconnection is temporary,  
12 and operation of the channel synchronization loss  
13 detection timer is canceled if it is determined that the  
14 contents of the state change correspond to a recovery  
15 from a channel disconnection and the re-synchronization  
16 monitoring flag is ON; and a channel synchronization  
17 loss is determined if a change in state of the same card  
18 cannot be detected within the timer time in the channel  
19 synchronization loss detection timer.

6. A method according to claim 2, wherein the  
2 step of trying comprises the steps of

3                   if a channel synchronization loss is  
4   determined, starting a synchronization failure timer and  
5   a synchronization timing updating timer, the  
6   synchronization failure timer defining at least one of a  
7   standard for a transmission timing of a channel trouble  
8   notification and a maximum trial time for channel  
9   re-synchronization, and the synchronization timing  
10   updating timer defining a unit time for a channel  
11   re-synchronization trial, and  
12                   checking a state of the channel upon  
13   expiration of the synchronization timing updating timer,  
14   and registering a synchronization timing updating timer  
15   again if a channel disconnection state is detected,  
16   while trying channel re-synchronization, and canceling  
17   operation of the synchronization failure timer if a  
18   channel has been or is being established when the  
19   synchronization timing updating timer expires.

7.                A method according to claim 2, wherein the  
2   step of notifying comprises the step of, when the  
3   synchronization failure timer expires without  
4   establishing channel re-synchronization after a plural  
5   number of times of channel re-synchronization trials and  
6   there is a normal channel, transmitting a channel  
7   trouble notification to a maintenance/monitoring console  
8   to prompt the console to make a channel check by using  
9   the channel, stopping a radio transmission/reception

10 unit which is performing call connection using the  
11 channel having undergone a channel trouble, and  
12 switching to another normal radio transmission/reception  
13 unit, the synchronization failure timer defining at  
14 least one of a standard for a transmission timing of a  
15 channel trouble notification and a maximum trial time  
16 for channel re-synchronization.

8.           A method according to claim 2, wherein the  
2 step of notifying comprises the step of, if there is no  
3 normal channel, restarting (resuming) a home station and  
4 standing by until a channel with a radio base station  
5 control station is recovered, in order to prevent a call  
6 connection failure due to a channel trouble.

9.           A mobile communication system including one  
2 maintenance/monitoring console, a plurality of radio  
3 base station control stations connected to said  
4 maintenance/monitoring console, a plurality of radio  
5 base stations connected to said radio base station  
6 control stations, and a plurality of mobile units which  
7 communicate with said radio base stations,  
8           said radio base station including  
9           channel synchronization loss determining means  
10 for determining a channel synchronization loss when no  
11 synchronization is established in a channel with one of  
12 said radio base station control stations, which is

13 connected to one of said radio base stations for a  
14 predetermined period of time,  
15 re-synchronization control means for trying  
16 channel re-synchronization upon shifting a timing of a  
17 channel synchronization clock used for communication  
18 with said radio base station control station connected  
19 to said radio base station, and  
20 notifying means for, when channel  
21 re-synchronization fails, notifying said  
22 maintenance/monitoring console of the failure.

10. A system according to claim 9, wherein  
2 said radio base station further comprises  
3 central control means for monitoring and  
4 controlling overall operation of the home station,  
5 a plurality of radio communication means for  
6 performing signal transmission/reception in a radio zone,  
7 a plurality of cards constituting the home  
8 station and having different functions,  
9 a current-system SDM and a standby-system SDM  
10 which constitute a redundant arrangement and store a  
11 control program for operation of the home station and  
12 operation parameters for monitoring an operation state  
13 between the home station and said radio base station  
14 control station,  
15 a shared memory in which a read operation  
16 parameter is expanded,

17                    monitoring time setting means for monitoring  
18 operation states of said plurality of cards, in a  
19 predetermined cycle, of the operation parameters stored  
20 in said current-system SDM and said standby-system SDM,  
21                    synchronization establishing means for  
22 defining a maximum trial time for channel  
23 re-synchronization,  
24                    a monitoring flag for identifying a card  
25 having undergone a channel disconnection upon occurrence  
26 of a channel disconnection, and  
27                    synchronization timing setting means for  
28 defining a unit time for a channel re-synchronization  
29 trial upon occurrence of a channel synchronization loss,  
30 and  
31                    said re-synchronization control means  
32 comprises re-synchronization control means equal in  
33 number to channels and communicates with said radio base  
34 station control station through a network.

11.                A system according to claim 10, wherein said  
2 central control means further comprises comparing means  
3 for periodically monitoring an operation state of each  
4 card at the expiration of a timer on the basis of said  
5 set monitoring time setting means, checking, upon  
6 detection of a state change, whether detected contents  
7 are identical to those previously detected, and storing  
8 the contents if the detected contents differ from those.

9 previously detected.

12. A system according to claim 11, wherein said  
2 central control means further comprises  
3 specifying means for determining one of said  
4 cards whose state change is detected, and  
5 determining means for determining whether or  
6 not contents of the state change correspond to a channel  
7 disconnection during operation of said card.

13. A system according to claim 12, wherein  
2 said synchronization loss determining means  
3 comprises a synchronization loss detection timer for  
4 setting a time during which a state change is monitored,  
5 and  
6 said determining means starts a  
7 synchronization loss detection timer, if contents of the  
8 state change correspond to a channel disconnection  
9 during operation of said card, on the basis of said  
10 synchronization loss determining means, and turns on the  
11 monitoring flag to detect a change in state of said same  
12 card within a timer period of the synchronization loss  
13 detection timer; cancels operation of the  
14 synchronization loss detection timer, if it is  
15 determined that the contents of the state change  
16 correspond to a recovery from a channel disconnection  
17 and the monitoring flag is ON; and determines a channel



18 synchronization loss if no change in state of said same  
19 card is detected within a timer time in the  
20 synchronization loss detection timer.

14.           A system according to claim 12, wherein  
2               said synchronization establishing means  
3 comprises a synchronization establishment timer which  
4 sets a maximum trial time for channel re-synchronization  
5 control upon shifting a timing of a channel  
6 synchronization clock, and  
7               said central control means further comprises  
8 re-synchronization establishing means for starting the  
9 synchronization establishment timer, if a channel  
10 synchronization loss is determined, on the basis of said  
11 synchronization establishing means, prompting said  
12 re-synchronization control means having undergone a  
13 channel disconnection to perform channel  
14 re-synchronization, causing said re-synchronization  
15 control means to set a synchronization timing value for  
16 said synchronization timing setting means, registering a  
17 synchronization timing updating timer if a channel  
18 disconnection state is determined upon checking of a  
19 channel state at the end of the synchronization timing,  
20 trying channel re-synchronization upon shifting a timing  
21 of a channel synchronization clock in communicating with  
22 said radio base station control station, and if a  
23 channel has been or is being established when the

24 synchronization timing updating timer expires, canceling  
25 operation of the synchronization failure timer upon  
26 reception of a channel re-synchronization establishment  
27 notification sent out from said re-synchronization  
28 control means for which a channel is established.

15.           A system according to claim 10, wherein  
2               said notifying means transmits a channel  
3 trouble notification to a maintenance person to prompt  
4 the person to perform a channel check using a normal  
5 channel, if any, when the synchronization establishment  
6 timer of said synchronization establishing means expires  
7 without establishing any channel re-synchronization by a  
8 plural number of channel re-synchronization trials, and  
9               said system further comprises switching means  
10 for stopping said radio communication means which is  
11 performing call connection using a channel having  
12 undergone a channel trouble, and switching to another  
13 radio communication means.

16.           A system according to claim 15, wherein said  
2 switching means restarts (resumes) the home station and  
3 stands by until a channel with said radio base station  
4 control station is recovered, in order to prevent a call  
5 connection failure due to a channel trouble, if there is  
6 no normal channel.

17.           A system according to claim 10, wherein said  
2   central control means further comprises updating means  
3   for downloading the operation parameter from said radio  
4   base station control station, writing the parameter in  
5   said standby-system SDM, and updating the parameter.